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A PROCEDURE AND DEVICE OF COOLING BY ABSORPTION

The present invention concerns a procedure and device for the production of cold by absorption, and more particularly a procedure and a device for the acceleration of the starting of cooling processes.

A cooling system by absorption comprises schematically a generator, an evaporator, and a condenser. To function, the generator is filled with a mixture of at least two mixable substances, from now on referred to as binary mixture (a coolant and an absorbent). This mixture is combined in an absorber in which the absorption of the coolant by the absorbent takes place. The coolant and the absorbent must have an evaporation pressure sufficiently different in order to, when the generator is heated, the most volatile of the two, be it the coolant, evaporates and transforms itself into a liquid in the condenser.

The absorption system normally includes a pump to return the binary mixture of the absorber towards the generator. The vapours pass through the condenser that condenses them in a liquid, which is taken towards the expansion valve of the evaporator for the desired cooling effect.

This principle being based on the heating of the binary mixture, the starting process is relatively slow. In fact, the temperature of the binary mixture has to be risen to several tens of degrees before becoming vapour. While the vapour is not produced the cooling function remains without effect.

Such a device, according to the preamble of Claim 1, is described in the document DE 28 56 767 A.

The objective of the present invention is to allow the production of cold by such a system from the starting of the cooling system.

This objective is achieved by a storing device of the coolant under pressure in a receiver supplied to this effect, and by a control of access to said receiver by means of two valves.

According to the invention the mixture under pressure is accumulated in a receiver during the normal functioning of the cooling system. Once the system is stopped this coolant under pressure is stored in the receiver thanks to a closing of the valves upstream and downstream of the receiver. The latter is then isolated from the cooling circuit and conserves thus the coolant under pressure.

From the starting of the cooling system this pressure will be used to feed coolant liquid under pressure the cooling circuit and thus to immediately produce cold. To this effect the valve downstream towards the evaporator will be open while the valve upstream of the condenser side is kept closed. The latter remains closed as long as the pressure at the exit of the condenser is lower than that in the receiver.

Once the process of vapour production is operational the valve upstream lets pass the coolant under pressure which on the one hand will feed the evaporator and on the other hand will fill the receiver for a next use.

The invention will be better understood with the help of the following detailed description referring to the annexed figures which are given as a non-limiting example, in which:

- Figure 1 represents the storing device of the coolant under pressure
- Figure 2 represents a monoblock embodiment.

In Figure 1 the generator 1 uses as an energy source a resistor. The mixture coolant-absorbent is heated and the most volatile of the two components, be it the coolant, is transformed into vapour. These vapours are condensed in a liquid in the condenser 2. The liquid under pressure then arrives in the valve upstream 3 of the receiver 4 that allows to access the receiver 4. This upstream valve 3 can for example be commanded electrically by a device that measures the different pressures. It can also be a differential valve that opens when the

pressure upstream exceeds the pressure downstream. It then works as an anti-return valve.

Downstream of the receiver 4 a second valve 5 is necessary for the functioning of the assembly. This valve is generally commanded by the feeding of the system. When the cooling system is interrupted it is immediately closed in order to keep the pressure in the receiver 4. In the same way when the system is locked it opens so that the coolant under pressure can feed the evaporator 7 by the expansion valve 6.

The coolant is then taken into the absorber 8 that mixes it with the absorbent to be re-injected in the generator 1.

The heat generated in the generator 1 can have different origins. According to the representation of Figure 1, it can be of electric origin or it can come from other heat sources, for example from the exhaust gases of a combustion engine.

According to one embodiment it is possible to add a supplementary valve for the access to the receiver in order to not slow down the starting of the process in the case where the receiver is empty. This valve only opens when the system produces enough liquid under pressure in order to be able to store a part in said receiver.

According to a particular embodiment of the invention it is possible during the stopping of the cooling system to close the downstream valve 5 before stopping the vapour production. In this way a suppression is produced in the condenser 2 which will be stored in the receiver 4. When the desired pressure is achieved the generator 1 is started. This suppression accumulated in the receiver 4 will be able to produce longer cold until a next re-starting of the system.

To satisfy security criteria a monoblock embodiment of the assembly is proposed such as illustrated in Figure 2. This assembly is composed of a

receiver 4 with its wall not welded, moulded in one piece in a material resistant to ammonia. Furthermore, it is sized to support a pressure of 50 atmospheres.

As indicated above this assembly is equipped with a non-return valve upstream 3, an electrovalve downstream 5, as well as a security valve 9 calibrated at 40 atmospheres. The three elements: non-return valve, electrovalve, and security valve are parts of the assembly and cannot be replaced individually.

From this fact the replacement of the receiver assembly may be done without danger even if in the receiver the ammonia under pressure remains. Only the coil 5 a of the electrovalve 5 can be replaced individually.

The two ends of the tube 10 are either welded or connected by means of two conical connectors with deformable joints 11.

The proposed assembly can have different shapes and sizes following the vehicle or machine on which it is assembled.

In certain cases the non-return valve 3 is replaced by an electrovalve.